

AbstractFast Solution of Integral Equations Representing Wave Propagation

A technique for solving a set of wave equations in a region uses points arranged in a grid spanning the region or coefficients of wave expansion for objects located in the region. The grid points or the coefficients are partitioned into blocks on multiple levels, and block impedance matrices encoding the wave equations is derived for pairs of blocks. The block impedance matrix need not be calculated as it is written as the product of two non-square matrices, denoted U and V . Each of U and V have one linear dimension which is only of the order of the rank of the block impedance matrix.levels. The rank is predetermined by coarse sampling. Two examples of the use of the invention are given: solving surface integral equations and Foldy Lax equations for partial waves.